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INSECTS FOUND UNDER BURLAP BANDS.

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During the months of May and June, 1927, I was stationed with the gipsy moth scouts at Henrysburg, near Lacolle, P. Q. In connection with the control measures for this pest the trees in the infested area were banded with burlap. The bands were attached to the trees in the following way:—a strip of burlap about 7 inches wide was placed loosely around the trunk of the tree at a height of 5 feet from the ground. This was tied in place by a piece of twine passed around its centre. After this had been done the upper part of the burlap was folded down so that a double layer hung from the twine. It thus offered an excellent hiding place for insects during the day.

In the infested area, about a square mile, approximately two thousand trees were banded. As the banding was done for the gypsy moth nearly all the trees that were banded were deciduous although about a dozen conifers had bands. The trees thus banded were in various locations, some being along the banks of a stream, others by the roadside, some in orchards, some on a small rise of about 50 feet and others out in the open fields. Two small pieces of woodland containing from 50 to 100 trees were amongst those banded. The kinds of trees banded consisted, in the order of their prevalence, of the following:—maple, apple, elm, willow, oak, ash and butternut.

During the month and a half that I was at Henrysburg it was my duty, in conjunction with others, to examine the bands on the trees. Since there were such a number of insects to be found under these bands I decided to make a collection of these as I went around. Under a single band on certain days there were as many as a hundred specimens, all, however, mostly of one species. Under some bands only one or two specimens were found, under others none throughout the whole period. The best time of day for collecting was in the early morning between 8.00 and 10.00 a.m. By noon few insects were present, but late in the afternoon they would begin to be numerous again. Whether the day was bright or dull did not seem to affect definitely the number of insects found. For several days we had a cool wind with a temperature of about 40°F. and during this time there were no insects at all under the bands, only a few spiders.

In all some 52 different species were found. This is exclusive of the Lepidoptera for these were only present in the pupal form and I was unable to determine them from their pupae although I believe they were all Hterocera. Of Coleoptera 43 different species were found. The click beetle, *Melanotus communis*, was the commonest of all. Next to this came *Telephorus bilineatus, carolinus*, and *Elater nigricollis* in the order named. Only two Diptera were actually captured under the burlap but many were seen resting on it, flying away, however, on the approach of the collector. Three species of Hymenoptera and three of Hemiptera were also taken. One lone cockroach was found tightly wedged in the bark under the burlap.

The following is a list of the species found:—

HYMENOPTERA

Vespa germanica Fab.
Ophion bilineatus Say.
Cimbex americana Leach.

DIPTERA

Calliphora vomitaria Linn.
Asilus snowi Hine.

HEMIPTERA

Apateticus bracteatus Fh.
Megalotomus 5-spinosus Say.
Blissus leucopterus Say.

NEUROPTERA

Blattela germanica Linn.

COLEOPTERA

Calosoma fridigum Kirby.
Lebia scapularis Dej.
Platynus placidus Say.
Harpalus pennsylvanicus De G.
Hydrobius fuscipes Linn.
Dermestes lardarius Linn.
Calitys scabra Thunb.
Chilocorus bivulnerus Muls.
Aphodius fimetarius Linn.
" *prodromus* Brahm.
Dichelonycha elongata Fab.
" *subvittata* Lec.
Adelocera marmorata Fab.
Elater nigricollis Hbst.
Elater linteus Say.
" *apicatus* Say.
" *sanguinipennis* Say.
" *rubricus* Say.
Dolopius lateralis Esch.
Melanothus communis Gyll.
Corymbites hieroglyphicus Say.
Pyractomena borealis Rand.
Podabrus diadema Fab.
Telephorus carolinus Fab.
" *bilineatus* Say.
Ellychnia corrusca Linn
Enoclerus quadriguttatus Oliv.
Thanoclerus sanguineus Say.
Tylonotus bimaculatus Hald.
Galeruca sagittariae Gyll.
Tirhabda canadensis Kirby.
Disonycha pennsylvanica Ill.
Phyllotreta armoraciae Koch.
Nyctobates pennsylvanica De G.
Upis ceramboides Linn.
Arthromacra aenea Say.
Pomphopoea sayi Lec.
Chelymorpha argus Licht.
Malachius aeneus Linn.
Phytonomus nigrirostris Fab.
Cryptorhyncus lapthi Linn.
Dendroctonus terebrans Oliv.
Cratoparis lunatus Fab.

THE GENUS APHROPHORA IN AMERICA NORTH OF MEXICO (CERCOPIDAE, HEMIPT.)*

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The American species of *Aphrophora* were first reviewed by Ball (Proc. Ia. Acad. Sci., VI, pp. 209-217, 1898) in his paper entitled "A Review of the Cercopidae of North America North of Mexico" in which eight species are treated, three of them therein described as new. Stern's paper (Conn. St. Geol. Nat. Hist. Surv. Bul. 34, pt. IV, 211, 1923) deals with the same species discussed by Ball with especial reference to their occurrence in Connecticut.

In working over a series of *Aphrophora* collected by Dr. C. J. Drake, the writer was surprised to find three species which on verification proved to be undescribed. Through the kindness of Dr. Drake the writer is able to present herein descriptions of these new species. A study has also been made of the *Aphrophora* material in the Iowa State College collection. Much of this ma-

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terial Dr. Ball had before him when he prepared his "Review" in 1898 and several specimens bear his determination labels. The collection also contains the types of *Aphrophora irrorata* Ball and *Aphrophora annulata* Ball. To Dr. H. H. Knight the writer is indebted for additional specimens of *Aphrophora irrorata* Ball, from the type locality and for his kindness in comparing several species.

The structure of the male genitalia has long been recognized to be of great assistance in the accurate allocation of species and figures of the male ventral plates are offered to facilitate identification of the males. The females are less easily recognized lacking as they do striking genital modifications. The following key adapted from Ball and based on characters common to both sexes is offered for the eleven species treated in this paper.

KEY TO SPECIES OF APHROPHORA OF AMERICA NORTH OF MEXICO

1. Elytra very broad and angulate at apices, the outer margin with two more or less distinct hyaline areas; front but slightly inflated and forming an acute angle with vertex; general aspect grayish brown ..... 2.
   Elytra elongate and rounded at apices, the outer margin without hyaline areas; front sometimes inflated and when so, forming a right angle with vertex; general aspect pale brownish to dark reddish brown ..... 3.
2. Length not exceeding 8 mm.; hyaline areas distinct; eyes viewed dorsally twice as long as broad; post ocular space reduced to a mere line ..... *quadrinotata* Say.
   Length 10 mm. or more; hyaline areas indistinct; eyes viewed dorsally one-third longer than broad; post ocular space not reduced to a mere line ..... *angulata* Ball.
3. Vertex at middle two-thirds as long as width between the eyes; front greatly inflated extending beyond vertex ..... *parallela* Say
   Vertex at middle not more than one-half as long as width between the eyes; front not extending beyond vertex ..... 4.
4. Front meeting vertex at almost a right angle ..... 5.
   Front meeting vertex at distinctly an acute angle ..... 7.
5. Front meeting vertex at a full right angle ..... 6.
   Front meeting vertex at a slightly acute angle; elytra irrorate with dark brown ..... *irrorata* Ball.
6. Length 10-12 mm.; eyes viewed from dorsal aspect more than twice as long as wide; elytra with dark oblique bands ..... *permutata* Uhl.
   Length not exceeding 9.5 mm.; eyes viewed from dorsal aspect one-third longer than wide; elytra without oblique dark bands ..... *princeps* n. sp.
7. Vertex and pronotum with a broad median pale stripe .. *saratogensis* Fitch.
   Vertex with at most a narrow median light stripe ..... 8.
8. Vertex at middle one-half as long as distance between the eyes ..... 9.
   Vertex at middle less than one-half as long as distance between the eyes 10.
9. Posterior margin of pronotum angularly emarginate in front of scutellum; pronotum with a weak median carina on basal half; pronotum shining with punctures not confluent ..... *canadensis* n. sp.
   Posterior margin of pronotum broadly and roundly emarginate in front of scutellum; pronotal median carina broad, well defined and extending from

base to apex; pronotum dull with punctures closely set and uniting to form a small scar on either side of posterior half ..... *punctipes* n. sp.

10. Pronotum and elytra heavily maculate with chestnut brown ..*annulata* Ball.
Pronotum and elytra almost unicolorous ..... *signoretii* Fitch.

Aphrophora quadrinotata Say.

Fig. 5.

Aphrophora quadrinotata Say, Jl. Acad. Nat. Sci. Phila., VI, p. 304, 1831.
Aphrophora fascialis Walker, Ins. Saund., Homop., p. 93, 1858.

This appears to be the commonest *Aphrophora* occurring in Eastern United States and Eastern Canada. It is most closely related to the Californian species *A. angulata* Ball but is readily distinguished by its smaller size and the two distinct triangular hyaline areas on the costal margin. The male genitalia also differ from all other species.

Specimens from the following localities have been examined: New Haven, Conn.; Lancaster, Lime Lake, N.Y.; Muskoka, Ont.; Ames, Ia. This species has also been reported from New England States, New Jersey, Maryland, Virginia, District of Columbia, Tennessee, Ohio, Wisconsin, Minnesota, Kansas (Stearns); Georgia, Florida, Nebraska (Ball); North Carolina (Metcalf); Pennsylvania, Illinois, North Dakota (Van D. cat.).

Aphrophora angulata Ball.

Fig. 4.

Aphrophora angulata Ball, Proc. Ia. Acad. Sci., VI, p. 212, 1898.

This species was described by Ball from a single female specimen from California. Ball mentions having other examples before him bearing Uhler's Mss. name *angulata*. A single male specimen bearing the label "California, Coquillett," in the Iowa State College collection agrees in detail with Ball's description and bears his determination label. The writer has examined a series of six males and five females collected by Dr. C. J. Drake at San Francisco, California, June 17, 1926, and these agree with the specimen bearing Ball's determination. Stearns records having examined fifteen males and fifteen female specimens from the California localities: "San Antonia Canyon, Ontario," "Sta. Cruz. Mts.," and "Almeda Co."

Aphrophora parallela Say

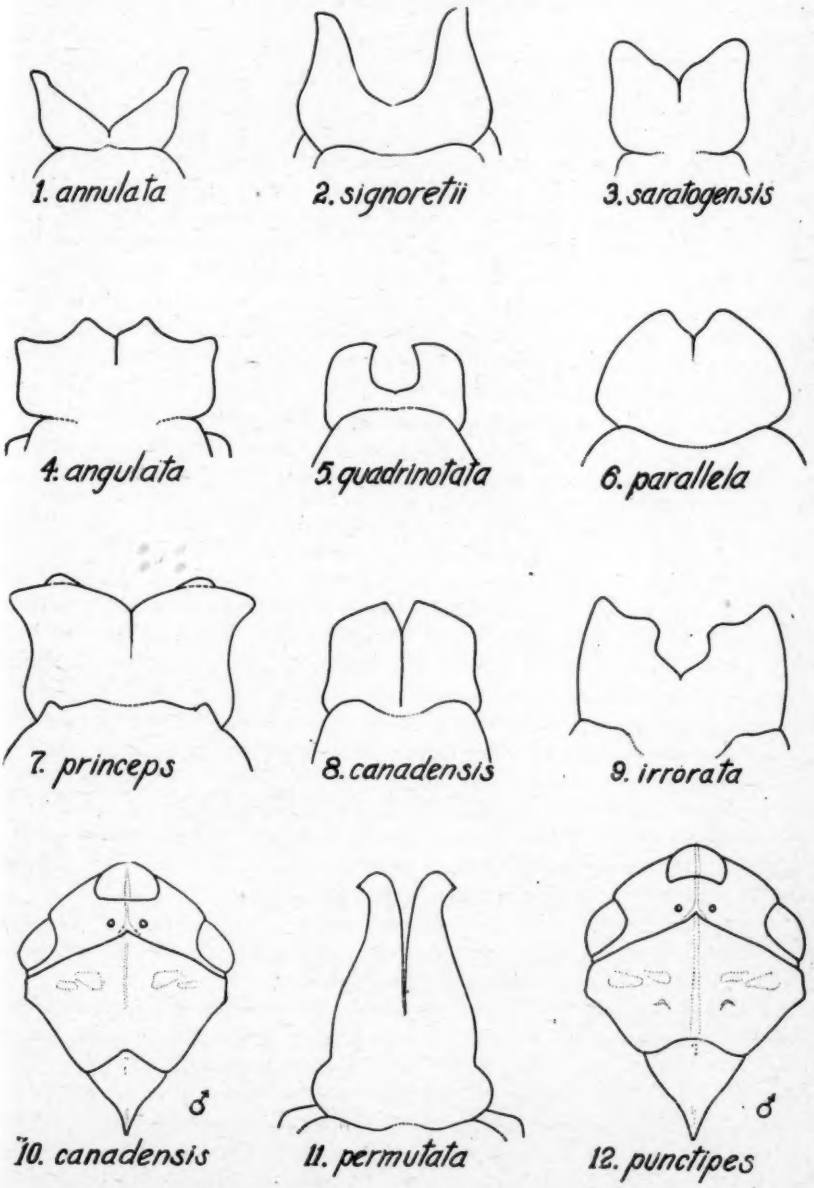
Fig. 6.

Cercopis parallela Say, Long's 2d Exp., p. 303, 1824.
Ptyelus cribratus Walker, List Homop., III, p. 712, 1851.

This species is best distinguished from *quadrinotata* and *angulata* by the more elongate elytra with rounded apices and without hyaline areas and by the greatly inflated front which extends beyond the tylus and forms a full right angle with the vertex. From *irrorata, permutata,* and *princeps* it is most easily separated by the longer vertex as mentioned in the preceeding key and from the remainder of the species by the front which meets the vertex at a right angle and not an acute angle. The form of the ventral genital plates will at once distinguish the males of *parallela* from the males of other species.

Aphrophora parallela is found in many of the same localities as *A. quadrinotata* Say. Specimens have been examined from Hamburgh, Colden, Buffalo, N. Y.; Ridgeway, Muskoka, Ont. Ball records having seen specimens from Ontario, New York, Pennsylvania, Vermont, Massachusetts, Maryland, West Virginia and Michigan. Other localities include New Jersey, Ohio, Wisconsin,

CAN. ENT. VOL. LX PLATE 16.



MALE STRUCTURES OF APHROPHORA SPECIES

Minnesota (Stearns); Nova Scotia, Illinois, Missouri, Arkansas. Say's Missouri and Arkansas records probably belong as Ball has remarked, to *A. irrorata* Ball.

Aphrophora irrorata Ball.

Fig. 9.

Aphrophora irrorata Ball, Proc. Ia. Acad. Sci., VI, p. 214, 1898.

Described from several specimens taken in Sioux County, Nebraska (War Bonnet Canon) and others taken in Rist Canon (Fort Collins) Colorado. The writer has examined a male and female labelled type from Squaw Canon, Sioux County, Nebraska (July 18, 22, 1892); also a male Pingree Park, Colorado and two females, Rist Canon, Fort Collins, Colorado; Aug. 22, 23, 1925, (H. H. Knight). One female collected by Knight is paler in color but bears the same type of markings and is structurally identical with the type specimens. The paler color appears to be due to the fact that the specimen is slightly immature. As mentioned above Say's record for *A. parallela* Say from Missouri and Arkansas probably refer to this species. It also seems probable that Van Duzee's records of California and British Columbia refer to either *A. permutata* Uhl., or one of the species herein described as new.

Aphrophora permutata Uhler.

Fig. 11.

Aphrophora permutata Uhler, Hayden's Surv. Terr., Rept. for 1870, p. 472 (Mss name).
Aphrophora permutata Uhler, Bul. U.S. Geol. Georg. Surv., I, p. 345, 1876 (described).

A rather variable species both in regard to size and color. In some specimens the color is a tawny yellow with the oblique elytral bands very conspicuous. In a series of eleven specimens from Fresno, California, the ground color is dark reddish brown and the oblique bands while present are not nearly as conspicuous as in a paler series from Victoria, B. C. The specimens in both series appear to be fully developed. Specimens of both sexes from Corvallis, Oregon and San Francisco, California, vary between two extremes. The male plates are long tapering processes and their structure at once distinguishes the male of this species from all other species of *Aphrophora*.

The writer has examined specimens from the following localities: Fresno, San Francisco, California; Manitou Park, Colorado; Corvallis, Portland, Oregon; San Juan Island, Washington; Victoria, Vancouver Island, British Columbia. It has also been reported from Montana, Idaho (Ball) and Utah (Uhler).

Aphrophora princeps n. sp.

Fig. 7.

Male. Length 9 mm.; width of pronotum 2.8 mm.; greatest length of elytron 7.3 mm.; greatest width of elytron 2.5 mm.

Vertex flat with a weak median carina. Anterior margin evenly rounded with tylus not produced. Vertex one-fifth longer at middle than next to eye. Posterior margin of tylus very slightly emarginate. Front inflated as in *Aphrophora permutata* Uhl. Pronotum with anterior third depressed; median carina weakly elevated on anterior half, obsolete apically. Pronotal punctures strong, less numerous and not so evenly distributed as in *A. permutata* Uhl. Posterior margin of pronotum angularly emarginate, the angle formed, 145 degrees. Elytra moderately long with the costal margin evenly and narrowly expanded. Outer subapical cell of elytra broadest and most posterior.

Color: General aspect dark reddish brown. Elytra without conspicuous dark bands. Antennae in mature specimens with second sement and base of style black. Vertex reddish brown, darkest on tylus and region behind. Median carina on vertex and tylus pale. Pronotum punctate with reddish brown. Scutellum pale on margins, median line and apex. Elytra reddish brown, the punctures darkened. Pale vermiculate markings from apex of scutellum across clavus to centre of corium, another before apex of clavus running transversely to middle of corium where it becomes much confused and extends backwards on area of subapical cell. Area of corium just beyond sutural margin and scattered areas between punctures of terminal cells, pale. Ventral abdominal segments pale on posterior margins.

Genitalia: Male ventral plates transverse laterally concave, broadly angulate at median apical region with a low black dorsally directed process on posterior margins.

Female: Differs from the male only sexually. Female ovipositor and pygofers short and compact as in *A. permutata* Uhl.

Holotype: ♂ San Juan Island, Washington, July 2, 1926, (C. J. Drake).

Allotype: ♀ Same data as holotype.

Paratypes: Nine males and one female, same data as holotype.

Holotype, allotype, and *paratype* in collection of Dr. Carl J. Drake, Iowa State College, Ames, Iowa. *Paratypes* in the collection of author, Iowa State College collection, Ames, Iowa and the Canadian National Collection, Ottawa, Ontario, Canada.

This species occurs in the same locality as *A. permutata* Uhl. The males are easily recognized by their genital characters and the females may be distinguished by their smaller size, more uniform color and the differences mentioned in the preceeding key.

Aphrophora saratogensis Fitch.

Fig. 3.

Lepyronia saratogensis Fitch, N. Y. St. Cab., p. 53, 1851.
Ptyelus detritus Walker, List. Homop., III, p 713, 1851.
Ptyelus gelidus Walker, List. Homop., III, p. 714, 1851.

Saratogensis Fh., *parallela* Say and *signoretii* Fh. have a very similar distribution throughout Eastern United States and Canada and because of their general resemblance to each other are liable to be confused, especially the female sex. The male genitalia however are quite distinct. From *parallela, saratogensis* may be distinguished by the much more weakly inflated front which forms an acute angle with the vertex and does not exceed the tylus forming a right angle as in *parallela.* From *signoretii* it may be distinguished by the pale vertical and pronotal stripe and by having all the ventral abdominal segments uniformly pale. In *A. signoretii* the general body color is a darker brown and the ventral abdominal segments are brown on the median basal half.

The writer has examined specimens from the following localities: Washington, D. C.; Glen Echo, Biltsville, Md.; Salamanca, Hamburgh, N. Y.; Muskoka, Ont. Other localities recorded include West Virginia, New Hampshire (Ball); New England States, South Carolina, Wisconsin (Stearns); North Carolina (Metcalf); Nova Scotia, Florida (Walker).

Aphrophora canadensis n. sp.

Figs. 8, 10.

Male. Length 9 mm.; width of pronotum 2.8 mm.; greatest length of elytron 7 mm.; greatest width of elytron 2.5 mm.

Vertex flat, one-half as long at middle as distance between eyes. Tylus slightly produced, one-half as long as vertex, posterior margin transverse. Vertex at middle one-third longer than next to eye. Median carina of head very weak. Front only moderately inflated forming an acute angle with vertex. Pronotum with anterior third slightly depressed; median longitudinal carina narrow, low and distinct on basal half. Pronotum with numerous punctures, the interspaces between punctures greater than diameter of punctures. Posterior margin of pronotum angularly emarginate, the angle formed, 125 degrees. Elytra broader in proportion to their length than in *Aphrophora princeps* with costal margin rather broadly expanded. Inner and outer subapical cells of elytra subequal in width.

Color: General aspect dull yellowish brown with vertex and pronotum darker than elytra. Elytra without conspicuous dark bands. Vertex and tylus with a narrow pale line. Tylus and region on vertex posterior to tylus, blackish. Pronotum evenly yellowish brown with blackish punctures. Scutellum concolorous with pronotum. Elytra punctures darkened on broad costal area and on region on both sides claval suture. A broad area parallel to costal margin, an oblique irregular line from apex of scutellum across clavus to centre of corium and an obscure transverse line before apex of clavus running transversely to middle of corium, yellowish white. Ventral abdominal segments yellowish brown with posterior margins narrowly yellowish.

Genitalia: Male ventral plates rectangular, attingent or inner margins, lateral margins slightly rounded, sub-truncate at apices with a small angular notch at middle between the two plates.

Female. Length 10 mm.; width of pronotum 3 mm.; greatest length of elytron 7.6 mm.; greatest width of elytron 2.5 mm. Color and markings as in male. Ovipositor and pygofers compact.

Holotype. ♂ Victoria, British Columbia, July 4-7, 1926 (C. J. Drake).

Allotype. ♀ Same data as holotype.

Paratypes. Twenty-seven ♂ and 28 ♀ Victoria, British Columbia, July 2-7, 1926 (C. J. Drake).

Holotype, allotype and *paratypes* in collection of Dr. Carl J. Drake, Iowa State College, Ames, Iowa.

Paratypes in the collection of author; Iowa State College collection, Ames, Iowa and the Canadian National Collection, Ottawa, Ontario, Canada.

The species may be readily distinguished from *Aphrophora saratogensis* Fh. by the distinctly different genital characters of the male and by the absence of the pale pronotal stripe. From *A. annulata* Ball and *A. signoretii* Fh. it is easily separated by the longer vertex. It appears most closely related to *A. punctipes* which has similar male genitalia but differs in the shape and puncturation of the pronotum.

Aphrophora punctipes n. sp.

Fig. 12.

Male. Length 10 mm.; width of pronotum 3 mm.; greatest length of elytron 7.5 mm.; greatest width of elytron 2.6 mm.

Resembles *Aphrophora canadensis.* Vertex flat, one-half as long at middle as distance between eyes. Tylus slightly produced and emarginate posteriorly. Vertex at middle one-fifth longer than next to eye. Median carina of head more pronounced than in *canadensis.* Front forming an acute angle with vertex. Pronotum with anterior third distinctly depressed; median longitudinal carina entire, rather broad, well defined, broadest and most elevated on the posterior half of pronotum. Pronotum rather thickly and heavily punctate, the punctures on each side of carina just behind the middle fusing to form a small scar. Posterior margin of pronotum broadly and roundly emarginate, not at all angulate. Elytra slightly longer than in *canadensis.*

Color: General aspect dusky yellowish brown, darker than *canadensis.* Vertex and pronotum not noticeably darker than elytra. Markings on vertex as in *canadensis.* Pronotum dusky yellowish brown with blackish punctures. Pronotal scars brown. Scutellum concolorous with pronotum. Elytra with darker ground color but same arrangement of paler markings as *canadensis.* Ventral abdominal segments brown with narrow yellowish brown posterior margins.

Genitalia: Similar to the male of *A. canadensis.*

Holotype; ♂ Fresno, California, June 20, 1926 (C. J. Drake).

On account of the similar genitalia this species is liable to be confused with the preceding, to which it is in all probability closely related. The structure of the vertex and pronotum however will readily separate the two species. In the 57 specimens of *A. canadensis* examined, the posterior margin of the pronotum is constantly angulate and the median carina obsolete on the apical half of the pronotum. The posterior lobe of the pronotum in *A. canadensis* is more evenly rounded, and the punctures never form scars as in *A. punctipes.*

Aphrophora annulata Ball.

Fig. 1.

Aphrophora annulata Ball, Proc. Ia. Acad. Sci., VI, p. 216, 1898.

Described from sixteen specimens from Wasatch, Utah, and since recorded by Stearns from New Hampshire, North Carolina, Colorado, Utah and California. The writer has examined a male specimen from the type series and the male genitalia are figured herein.

Aphrophora signoretii Fitch.

Fig. 2.

Aphrophora signoretii Fitch, Trans. N. Y. St. Ag. Soc., XVI, p. 388, 1856.

This species is most easily confused with *A. saratogensis* Fh. and *A. annulata* Ball. The male genitalia of all three species are very distinct. For differences between *signoretii* and *saratogensis* see under *A. saratogenssis. Signoretii* may be separated from *annulata* by its darker and much more uniform coloration. In *annulata* the pronotum is ochraceous with a reddish brown stripe arising on either side the median carina and running backward and outward to end rather broadly on the claval margin. In *signoretii* the pronotum is a tawny brown and lacks conspicuous markings.

Specimens from Salamanca, N. Y. and Muskoka, Ont., have been examined by the writer. Metcalf records the species from North Carolina.

TWO NEW SPECIES OF BOLBOCEROSOMA WITH NOTES ON THE HABITS AND GENITALIA OF OTHER SPECIES.*

BY W. J. BROWN,
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The purpose of the present paper is to describe two new species of *Bolbocerosoma* and to figure the genitalia of the North American species of this genus. It therefore supplements the paper of Dawson and McColloch (Can. Ent., LVI, 9-15).

The species of *Bolbocerosoma* are nocturnal. They spend the day in vertical burrows which are from four to twelve inches deep. They are more or less gregarious in habit; a hundred yards of country lane or a half acre of pasture will usually yield a dozen or more specimens if inhabited by the beetles. Isolated burrows are rarely found. Rarely a male and female occur together in a single burrow. In a colony of the beetles, there are always numerous deserted burrows. The colonies seem quite permanent, for those found by the author in 1923 were inhabited each season until 1926, after which no collecting was done. The colonies are often mixed, the author having found *lepidissimum, bruneri,* and *biplagiatum* in adjacent burrows. In colonies of the latter species, he has found *confusum,* also. *Bolboceras fossatus* Hald. and *Eucanthus lazarus* Fab. occur in the same manner and are often found in colonies of *Bolbocerosoma.* The notes given above are from observations made by the author near Stillwater, Oklahoma.

Three types of genitalia are found in our seven species of *Bolbocerosoma.* In the first type, found in *farctum* and *confusum,* the aedeagus is much larger and more heavily chitinized, and each lateral lobe is relatively larger and is triangular in form. The apex of each lateral lobe is acutely angulate and is not thickened. On the dorsal aspect of the aedeagus, the lateral lobes overlap or are narrowly separated. In *biplagiatum, pusillum,* and *lepidissimum,* the aedeagus is smaller and less heavily chitinized. The lateral lobes are widely separated on the dorsal face of the aedeagus, and their apices are thickened and broadly rounded. In the third type, found in *tumefactum* and *bruneri,* the aedeagus is intermediate in size and in degree of chitinization. The lateral lobes are very widely separated dorsally, and their apices are bluntly angulate and are not thickened. In this group only, the lateral lobes are not lobate basally.

In the accompanying figures, the median lobe is shown in several different positions. The relative position of the median lobe is not constant, and one seldom finds two specimens in which these lobes are in the same relative position.

The following table is that of Dawson and McColloch modified to include the new species described below.

TABLE TO SPECIES.

1. Elytron with seven deep and strongly punctured striae between suture and humeral umbone ..... 2.
   Elytron with five deep and strongly punctured striae between suture and humeral umbone, the second and fifth striae feeble or obsolete ..... 3.

*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

2. Distal black area of elytron confluent with the black sutural stripe; pronotum never with a median black spot. Ohio to South Dakota and Oklahoma ..... *bruneri* Daw. and McColl.
Distal black area of elytron well separated from the black sutural stripe; pronotum usually with a median black spot or stripe. Connecticut to Alabama ..... *tumefactus* Beauv.

3. Strial punctures of elytra bearing fine, long, erect, yellow hairs. Kansas, Colorado, New Mexico and Texas ..... *pusillum* Daw. and McColl.
Strial punctures without hairs ..... 4.

4. Elytron with a very large distal black area which is confluent with apical half of sutural stripe and with the black lateral margin throughout most or all of its length ..... 5.
Elytron with a slightly postmedian, oval, black spot which is separated by approximately its own width from both the sutural stripe and the lateral margin ..... 6.

5. Second elytral stria entirely obliterated; length 8.5 mm. Oklahoma ..... *lepidissimum* n. sp.
Second elytral stria very feeble but evident; length 10 to 12 mm. New Jersey to Alabama ..... *farctus* Fab.

6. Elytral spot more elongate; basal black border of pronotum without a median dentiform projection; pronotal declivity with at least the apical two-thirds coarsely punctuate. Iowa, Oklahoma and Arkansas .. *confusum* n. sp.
Elytral spot less elongate; basal black border of pronotum usually with a median dentiform projection; pronotal declivity coarsely punctate only in apical half. Wisconsin to Arkansas and Texas *biplagiatum* Daw. and McColl.

Bolbocerosoma lepidissimum n. sp.

Length 8.5 mm.; width 6 mm. Pale brownish yellow in color; the dorsum marked as follows: head except clypeus and trophi, pronotal carina and its limiting concavities, apical pronotal margin in front of the carina, pronotal base between the elytral humeri, scutellum, extreme base of elytra, sutural intervals, an area on each elytron extending from humerus and sutural interval at middle to apex but not including the subapical umbone, blackish; venter and legs yellow, outer margins of tibiae narrowly black.

Fine secondary puncturation of pronotum very indistinct. Second elytral stria entirely obliterated; fifth stria not impressed, represented except at base and apex by feeble punctures; eighth stria resembling the fifth; strial punctures without hairs.

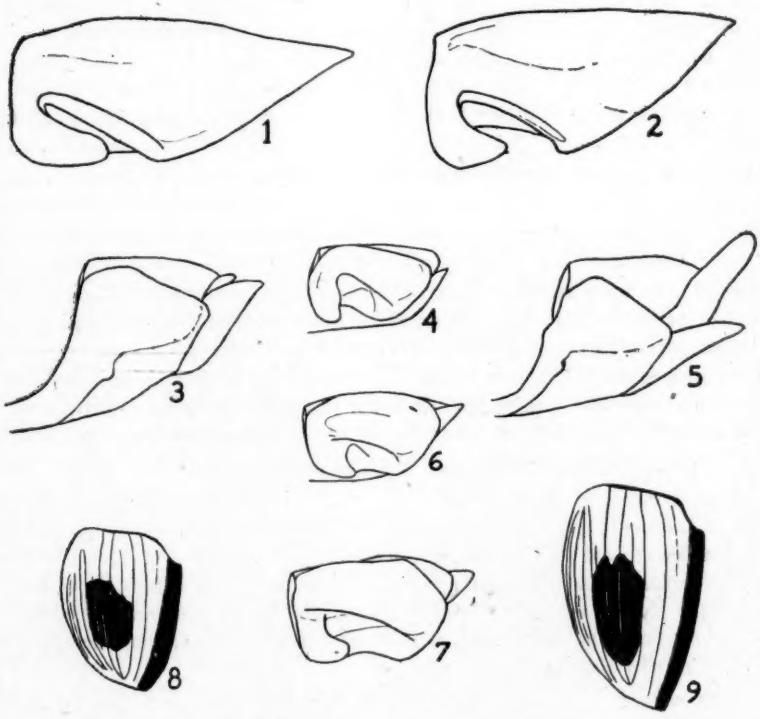
Mesosternal prominence between the middle coxae slightly elevated above the metasternum, very acute. Hair of underside not dense. Anterior tibia with eight external teeth.

Male. Head very finely and sparsely punctate throughout. Pronotum at middle with very few, irregularly placed, coarse punctures; the puncturation on the sides finer and dense but much less dense than usual; the declivity moderately finely and sparsely punctate on apical third, the basal two-thirds very finely punctate. Pronotal modification feeble, the carina broadly, feebly emarginate. Genitalia similar to those of *pusillum*.

Female. Head densely, rather coarsely punctate; a space on the vertex smoother. Pronotum at middle very sparsely, irregularly punctate; the punctuation of the sides finer and dense; the declivity with moderately close coarse punctures on apical half, the basal half very finely punctulate. Pronotal modification of the usual type, not strongly developed, the limiting concavities and tubercles obsolete.

Holotype.— ♂, Payne Co., Okla., October 10, 1926, (W. J. Brown); No. 2654 in the Canadian National Collection, Ottawa.

Allotype.— ♀, Payne Co., Okla., October 17, 1926, (W. J. Brown).



1. *Bolbocerosoma farctum* (Fab.); 2. *Bolbocerosoma confusum* n. sp.; 3. *Bolbocerosoma bruneri* Daw. and McCol.; 4. *Bolbocerosoma lepidissium* n. sp.; 5. *Bolbocerosoma tumefactum* (Beauv.); 6. *Bolbocerosoma pusillum* Daw. and McCol.; 7. *Bolbocerosoma biplagiatum* Daw. and McCol.; 8. *Bolbocerosoma biplagiatum* Daw. and McCol.; 9. *Bolbocerosoma confusum* n. sp.

This species is remarkable for its pale color and for the fine and sparse puncturation of the male. Because of its maculation, it resembles a very small, pale *farctum*. It is closely allied to *pusillum* but lacks elytral hairs. The head and pronotal punctures are much sparser and the strial punctures of the elytra are coarser in *lepidissimum* than in *pusillum*.

Bolbocerosoma confusum n. sp.

Length 10-12 mm.; width 7-8.5 mm. Sanford's brown in color; the dorsum marked as follows: head, pronotal declivity except at middle, basal margin

of pronotum between the elytral humeri, scutellum, extreme base of elytra, sutural interval, and a spot on each elytron, black; the elytral spot moderate-sized, elongate oval, parallel to the striae, median or slightly post-median, separated from the lateral and sutural margins by spaces equal or almost equal to its own width; ventral thoracic sclerites and legs except femora in part, blackish; abdomen brown or brownish yellow.

Head with a space on vertex less closely but not sparsely punctate. Pronotum at middle coarsely, not closely, irregularly punctate, the punctures becoming less coarse and very dense on the sides; the fine secondary puncturation rather indistinct.

Second elytral stria obsolete except at base, not more than twice as long as the scutellum, very feebly impressed, with a few very feeble punctures; fifth stria feeble, not strongly punctate, not reaching base or apex; eighth stria scarcely impressed, otherwise resembling the fifth; strial punctures without hairs.

Mesosternal prominence between the middle coxae elevated slightly above the plane of the metasternum. Hair of underside moderately dense. Anterior tibia with seven or eight external teeth.

Male. Vertex rather sparsely punctate; the adjacent parts of the head closely punctate. Pronotal modification but little more strongly developed than in the female; the carina broadly and feebly emarginate at middle; the concavity and tubercle on each side moderately strong; the declivity sparsely punctate, usually with at least the apical two-thirds coarsely punctate. Genitalia similar to those of *farctum* but each lateral lobe with the angle at the junction of the free outer margin and the oblique basal margin less obtuse, and the apical angle less prolonged than in *farctum*.

Female. Vertex closely punctate throughout but with a small area less closely punctate than the adjacent parts. Pronotal modification of the usual type; the declivity rather closely punctuate, at least the apical two-thirds coarsely punctuate.

Holotype.—♂, Payne Co., Okla., October 9, 1923, (W. J. Brown); No. 2653 in the Canadian National Collection, Ottawa.

Allotype.—♀, same data.

Paratypes.—10♂, 8♀, Payne Co., Okla., May and October, 1923-1926, (W. J. Brown); 1♀, Rogers, Ark., (Merrill); 4♂, 6♀, Imboden, Ark., 1926, (B. C. Marshall); 1♂, Ames, Iowa.

This species is intermediate between *farctum* and *biplagiatum* and has been confused with the latter in collections. The male genitalia of *confusum* approach those of *farctum*, and the puncturation of the vertex and pronotal declivity and the development of the pronotal modification in the male are similar in these two species.

The maculation is similar in *confusum* and *biplagiatum*. The elytral black spot varies in size and form in both species, but it is nearly always more elongate in *confusum* than in the allied species. The figures show the elytral maculation of the holotype of *confusum* and of an average specimen of *biplagiatum*. In *confusum* the black basal border of the pronotum always lacks a median dentiform projection. Such a projection is distinct in all except a very few specimens in the large series of *biplagiatum* at hand. In *biplagiatum* the coarse punctures of the

pronotal declivity are more sparse than in *confusum* and are usually confined to the anterior half of the declivity. The average size of *confusum* is slightly larger, and its form is slightly more elongate.

Males of *confusum* can be identified easily by the genitalic characters. It is difficult to separate the females from *biplagiatum,* and the most reliable character for this is the puncturation of the pronotal declivity.

The Rogers, Arkansas, paratype of *confusum* is also a paratype of *biplagiatum.* It is in the collection of Mr. Warren Knaus.

SOME NEW GENERA AND SPECIES OF N. A. DERBIDAE WITH NOTES ON OTHERS (FULGORIDAE).

BY E. D. BALL,
Sanford, Fla.

The species of *Otiocerus* occuring north of Mexico can readily be divided into three apparently natural groups as follows:—

Group I.—Head as seen from side, deeply triangularly indented just before the acute upturned apex—Elytra angularly inflated at apex ..... Genus *Hynnis* Burn (preoccupied)—*Apache* Kirk.

Group II.—Dorsal margin of head straight or nearly so, apex slightly acutely angled above, rounding below ..... Genus *Otiocerus* Kby.

Group III.—Apex of head rounding, not angled above; color variable, pale to deep smoky with red nervures ..... Genus *Shellenius* nov.

The genus *Apache* includes only one N. A. species; *A. degeeri* Kby., which in a number of characters is quite distinct.

KEY TO THE SPECIES OF OTIOCERUS

A.—Reddish or smoky; solid color, ... *stolli* Kby.
AA.—Spotted or banded or both.
B.—Elytra uniformly spotted and sometimes slightly banded.
C.—Spots smaller and wanting at base ..... *abboti* Kby.
CC.—Heavily spotted and sometimes obscurely banded ..... *francilloni* Kby.
BB.—Elytra banded.
D.—Bands broad, obscure, five spots on basal half .... (*signoreti* Fh.)—*reaumuri* Kby.
DD.—Bands narrow oblique.
E.—Band scarlet ..... *coqueberti* Kby.
EE.—Band brown, head with black mark ..... *wolfi* Kby.
EEE.—Band brown, head without mark ..... *amyoti* Fh.

KEY TO THE SPECIES OF SHELLENIUS

Head short, dorsum curved ..... *schellenbergi* Kby.
Head long, straight ..... *balli* McA.

Otiocerus kirbyi Fh. is unknown to the writer. It would fall under CC. of Group II by description. It may well be a pale form of one of these species. The species found in collections under the name of *signoreti* Fh. is undoubtedly *reaumuri* Kby. Metcalf separated the latter as "without" the five spots ignoring the fact that Kirby specially describes them. In the explanation of Plate 40 Metcalf has reversed the name of *O. degeeri* and *coqueberti.* The head of the example of the latter species must have been distorted or out of focus as in nature the apex is but little less than a right angle.

Fowler in the Biologia describes seven new species under the genus *Otiocerus* without recognizing any of the ten previously described. Of these species two (from C. A.), *venustus* and *breviceps,* evidently belong to Group II. Three of them; *montanus* (Mex), *graiseus* (Mex) and *gracilior* (C.A.) belong to Group III and may well include the very variably colored species that McAtee later described as *balli.* One species *O. interruptus* (C.A.) cannot be placed, as the head is neither described nor figured. *O.* (?) *rubescens* (Mex) is certainly not an

Otiocerus if the artist has correctly interpreted the venation.

Genus **Shellenius** nov.

Resembling *Otiocerus* in general form and structure but with the elytra extremely long and narrow before the roundingly expanded apex. The head is horizontal, extremely long and thin, the upper and lower margins almost straight, the apex rounding.

Type of the genus *Otiocerus balli* McAtee.

In *Apache* the head is much broader at the base than at the apex and the whole structure is at an angle with the body. The elytra in *Apache* are somewhat narrowed but the apical enlargement is angulate. The representatives of *Shellenius* are apparently more abundant in the subtropical region. *S. schellenbergi* and *balli* are both found commonly along the margins of the deeply shaded swamps in Florida. Early in the fall they were taken from the leaves of maple and blue beach but later were found almost exclusively on the under sides of the broad palmetto leaves, probably a hibernating place as they have been taken occasionally in the spring.

Apache degeeri is also common in the swamps of Florida and has been taken from the leaves of several trees. Mr. W. E. Stone took an example of *O. francilloni* from a palmetto leaf at Sanford. Mr. J. A. Reeves captured an example of *wolfi* from maples in a swamp at Silver Springs, Florida, and Dr. C. J. Drake one at Belmont, Miss. Mr. Reeves also took an example of *O. stolli* in a black jack oak area with a few scattered hickory at Ocala, Florida.

Genus **Anotia** Kirby

A number of examples of what appears to be *Anotia bonneti* Kby. have been taken in Florida swamps in the past two years. They have the venation, pattern of marking and the striking antennae of that species; while variable they are mostly paler than the picture would indicate. Kirby's figure, however, shows three spots on one wing tip and four on the other, with quite a difference in the shape and width of the bands on the two wings. Fowler places his *A. ruficollis* (Mex) in the section with broad antennae. The antennae are shown with the seta arising from a ledge far back of the apex, the pattern and markings are all typical of *bonneti* and it is no doubt that species.

A invalida Fowl. (C.A.)=*kirkaldayi* Ball. The black spots along the basal portion of the sub costa and again before the apex of clavus together with the irregular tawny clouding are quite distinctive.

Anotia venustula Fowl. (Mex)=*Amalopota fitchi* V.D. The examples of *fitchi* taken in Florida are for the most part even darker than Fowler's figure, the heavy black lines extend from the front across the head, thorax and elytra to join the cloud at the apex. Fowler's description emphasizes the red veining, though not shown in his figure.

Anotia smithi Fowl. is no doubt distinct if his side view drawing of the antennae is correct. *A. marginicornis* is certainly not an *Anotia* if the venation shown is typical.

Specimens of *A. robertsoni* Fh. taken in the swamps in Florida grade into *burneti* Fh. in possessing the black markings on the three abdominal segments.

Genus **Sayiana** nov.

Resembling *Anotia* in general form of head and antennae but much larg-

er, as large as an *Otiocerus,* head elongated obliquely upward and forward, rounding to a slightly acutely angled apex. Antennae with the second joint extremely long and flat, parchment like, pustulate with a thickened margin, the slightly oblique apices about equal the apex of vertex. Elytra as long as in *Otiocerus* but much broader at base, venation similar to *Anotia* but simplified; medius with four branches back of the cross vein where in *Anotia* there would be only three. Costal appendage very large arising just back of the hinge, rapidly narrowing into a narrow triangular flap that curves back two-thirds of the way across the base of elytron.

Type of the genus *Anotia sayi* Ball.

This species was described from N. Y. and the writer has taken it in Iowa. There is an example in the National Museum labeled Lake City, Fla. 4-19-189? (Uhl. Coll.).

Genus **Mula** nov.

Resembling *Muiria* but with head broader as in *Cyclocara;* elytra with even larger cells. Vertex broad at base gradually narrowing to a thin wedge; vertex and front as seen from side only slightly protruding from the contour of the dorso-ventrally elongate eyes, and finally joining the clypeus with only a slight depression. Antennae with second joint slightly longer than femur, broad, flat, strap-shaped or slightly broadening, with a definite shoulder nearly one-fourth of length from apex. Pronotum very broad, broadly incised posteriorly. Elytra held nearly vertical in repose and in a plane transverse to the axis of body, the costal margin out. Venation of the general pattern of *Sikaiana* and *Muiria,* but with the relative proportions of the cells greatly modified. The three main veins are placed close together and parallel and the costal margin is folded so that the radius appears to form the margin except at the extreme base and apex. A very broad basal, one immense discal and two smaller cells occupy most of the membrane. The rest of the cells are small and grouped around the apical and posterior margins. Hind wing strap-shaped, reduced as in *Proutista,* but still functional and carrying two veins. Stridulating appendage larger than in *Muiria.*

Type of the genus *Mula resonans* n. sp.

Mula resonans n. sp.

Superficially resembling *Muiria stridulenta* in size and appearance. White with three faint bands on elytra. Length 2 mm. length of an elytron 5 mm.

Vertex and front white, a red dot at the slightly accentuated union. Eyes black, antennae pale with a smoky crescent on the broadest part just before the base of the bristle. Pronotum white, glistening; rest of body waxy white with smoky areas each side of the base of abdomen. Elytra hyaline with three narrow, irregularly transverse, smoky bands following the nervures; serrations and transverse nervures along costa as well as some spots on the apical half scarlet.

Holotype, male, taken by the writer at Silver Springs, Fla. Nov. 3, 1927.

Allotype, female and two *paratype* males from Dr. Dozier taken at Magnolia, Miss., June 11, 1923 by T. H. Jones and W. G. Bradley and labeled "from shrubs and weeds." One female and seven male *paratypes* taken by Mr. Stone, Mr. Reeves and the writer at Sanford Nov. 14 and 19, 1927.

This striking species was found resting on the undersides of nearly hor-

izontal cabbage palmetto leaves in the deep shade of the densest swamps of the region. They were nearly all resting at about two-thirds the distance from the base to the margin and all carried their wings in a fan-like vertical position. In life they resemble a pair of enormous ears on a very small pale donkey. Their large resonant cavity and stridulating organs are probably made more effective by the use of the large leaf of the palm as a sounding board. The position taken at a certain distance from the margin of the leaf may be determined by this factor.

Cyclocara Muir and **Sikaiana** Dist.

Muir has placed *Patara vanduzei* Ball (N.Y.) in the genus *cyclocara* Muir. *Patara marmorata* Fowl. (Mex.) has the same type of head and venation and no doubt should be referred to the same genus.

Euklastis harti Metc. (III) appears to belong, as Muir has suggested, to *Sikaiana* Dist. The venation shown on the elytral drawing in Metcalf's Key is quite different from that on his colored figure. An example of this pretty species at hand from North Carolina resembles the colored figure in venation in that the second branch of the medius is nearly equally spaced with the first and third instead of four times as far from third as shown in the wing drawing.

Genus **Mysidia.**

Examples of *Mysidia mississippiensis* Doz. were taken from the margin of a swamp near Sanford, Fla. on Sept. 24. They were at that time abundant on the leaves of second growth maple. A few were taken on cabbage palmetto in November.

Mysidia rubidella nov.

Resembling *albipennis* but much smaller with the body scarlet. Length of body, 2.5 mm. Wing expanse, 11 mm.

Vertex extremely narrow almost foliaceous; pronotum deeply acutely angled posteriorly. Elytra narrow, hyaline the nervures prominent. Venation simple and regular except that the fourth anteapical cell is triangular with a long petiole. Color of entire body scarlet. The vertex, front and male plates pale; Eyes black, wings hyaline, veins brown with delicate fulvous clouds in the forks and along the cross nervures. Male plates widely separated at base, elongate, expanding apically.

Holotype, male from Presido Vera Cruz, Mex.—June. (O. W. Barrett) in authors collection. This is a strikingly distinct species in color, the pattern of venation and the small size, in other characters it approaches some of the large South American forms.

Dysimia maculata Muir described from Porto Rico was taken in numbers on Nov. 19 from the undersides of Palmetto leaves in a deeply shaded swamp near Sanford, Fla. by W. E. Stone, J. A. Reeves, and the writer. This species resembles a *Mysidia* in form and habits but the large round black spots are quite striking and distinctive.

Genus **Cedusa** Fowl.

The writer in working up his recent additions by McAtee's valuable revision of this genus found that he had seven species not previously recognized from Florida and that two of them appear to be undescribed.

C. maculata V. D. This beautiful and distinct species was taken in the deep shade of a swamp at Silver Springs, Fla., Nov. 3, 1927 by Stone, Reeves, and

the writer. Another example from Jennette, Pa. was taken Aug. 15 by Rev. Modestus Wirtner.

Superficially resembling *maculata* and *wolcotti* in general ornamentation but extremely minute with the structure of the *obscura* group. Length 2-2.5 m.

Cedusa minuenda n. sp.

Vertex twice wider than long, genal ridge low, transverse veinlets on disc of elytra faint or wanting so that only two subapical cells appear, these made by forking nervures. Color, creamy, the vertex, front, and mesonotum except for the carinae testaceous. Elytra smoky, the longitudinal nervures broadly white. Below yellow, the tip of rostrum deep black. Male plates white, rather long, together convex, a triangular space between them at the base, an angular one in the middle, beyond this the apices curve up and slightly outward.

Holotype, male (3-10-27), *allotype,* female (9-16-25) together with three males and three female *paratypes,* all from Sanford, Fla: taken by W. E. Stone, J. A. Reeves, and the writer while sweeping flat woods areas.

The writer has also taken this species at Tampa and Palm Beach, Fla. in Nov. and Dec. respectively. This is by far the smallest species in the group and one of the most easily recognized by both size and color.

C. flavida V. D. described from Jamaica has been taken abundantly sweeping at Sanford, Fla. (B.S. & R.).

C. edentula V. D. The drawing of the male genitalia in McAtee's review and those presented by Metcalf are very different and both appear to be due to distortion during drying. The inner margins slightly roundingly approach each other at about two-thirds the distance and then are slightly concavely (not angularly) excavated to the blunt apices. *C. hedusa* McA. appears to be only another variation of the same structure.

C. kedusa McA. was taken by the writer in abundance on sycamore at Chevy Chase, Md. in July 1920 and again in 1924. The sycamores were growing in a grassy meadow.

C. cedusa McA. was taken by the writer on a pure stand of *Carex* at Amery, Wisc. in July.

C. mallochi McA. was taken at Sanford, Fla. in March and July.

Cedusa chuluota n. sp.

Resembling *flavida* VanD. in size and testaceous yellow color with only a trace of smoky on the elytra. Length 4 mm. The genal ridge is less prominent than in *flavida* and the face darker so that the median carina is especially emphasized as a light line throughout. The male plates are broader and shorter than in *flavida* resembling *bedusa* in proportions but much more widely separated than either and with the inner margins twice approaching each other, the first rounding the second in the form of acute spines, the two sinuations dividing the margins into three approximately equal segments, apices of the plates bluntly spoon-shaped with a short broad triangular membraneous hook.

Holotype, male, *allotype,* female and four *paratype* males taken March 16, 1927 at Sanford, Fla. on the ditch fern (*Woodwardia*).

C. cedusa McA. This species has been taken at Sanford, Fla. the past season on the Royal fern in a Sphagnum bog.

C. obscura Ball. The writer has collected this species in Colorado, Wisconsin

and Vermont in the North and Florida in the South and has examples from Miss. (Drake). It is one of the commonest and most widely distributed species in Florida. The Ark. examples of *tedusa* McA. appear to be this species. The inner margin of the plates are curved upwards (downwards) which gives the appearance of emargination shown. McAtee's figures of the plates of *obscura* are not typical of the species. In the example from which they were drawn the plates had been folded over each other so that the convex inner margins were obscured. The picture of the plates of *fedusa* McAtee is correct for *obscura* and is no doubt that species. This will add Ark., D. C., and Md. to the distribution of *obscura*.

C. incisa Metc. was taken by the writer abundantly on Birch at Ladysmith, Wisc. July 19, and still more abundantly from grass clumps (Andropogan) at Osceola, Wisc. July 20. It has been taken in Florida the past season on pine with *Andropogan* beneath.

REVISION OF THE AMERICAN SPECIES OF ARCHYTAS (TACHINIDAE, DIPTERA).*

BY C. HOWARD CURRAN,
Ottawa, Ont.

The genus *Archytas* was erected in 1867 with *A. bicolor* as type. In 1888 Van der Wulp established the genus *Nemochaeta* with *dissimilis* as type and in 1903 gave a key to the Central American species. Since that time no treatment of the species occurring in America has been presented and the description of the species are for the most part very unsatisfactory, resulting in uncertainty as to their identity. In most cases it is impossible to determine the described species without an examination of the types and until such time as these have been examined they must be considered unrecognizable.

My sincere thanks are due Dr. J. M. Aldrich for the loan of the material in the United States National Museum, including typical material, and notes on species represented by uniques in the collection.

The limits of the genus are not sharply defined and it is by no means certain that all the species previously included belong here. Two of the species included in the present paper are referrable to the genus *Jurinia*. They have been included because of the fact that one of them has been placed in *Archytas* and has been confused with a species typical of *Archytas* and because these forms will trace to *Archytas* in available keys. The males are, for the most part, readily separated by means of genitalic characters but the females belonging to the *analis* group cannot, in some cases, be separated with any degree of certainty. Several species originally described from South America and recorded from temperate North America and the West Indies have been wrongly identified and the names must be removed from the Nearctic list.

From the material studied it appears that the retention of the various groups in a single genus is advisable and the division into genera becomes difficult inasmuch as there are intergrading forms. In the *analis* group all the species are very similarly colored but this group is not sharply limited, although more readily distinguished than the others. The names herein considered synonymous with *Archytas* are tabulated as follows:

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Archytas Jaennecke.

Abhandl. Senckenb. Gesellsch. Frank., VI, 392, 1867 Sep. pag. 84. (Type *bicolor* Jaenn.= *diaphana* Fabr.); Brauer and Bergenstamm, Denksch. Akad. Wien., LX, 146, 1893; Coquillett, Rev. Tach., 141, 1897.

Nemochaeta Van der Wulp., Biol. Centr. Amer., Dipt., II, 38, 1888; id, 478, 1903. (Type *dissimilis* Wulp.).

Tachinodes Brauer and Bergenstamm, Denksch. Akad. Wien., LVI, 133, 1889. (Type *hystrix* Fabricius. Identification doubtful).

?*Parafabricia* Brauer and Bengenstamm, Denksch. Akad. Wien., LXI, 612, 1894. (Type Tachina *bicolor* Wiedeman.).

Pseudoarchytas Townsend, Ins. Ins. Mens., II, 186, 1914. (Type *marmorata* Tns.=*piliventris* Wulp).

Neoarchytas Townsend, Proc. U. S. N. M., XLXIX, 431, 1915. (Type *inambarica* Towns.).

Makasinocera Townsend, Proc. U. S. N. M., XLXIX, 432, 1915. (Type *unguis* Towns.).

KEY TO ARCHYTAS

1. Pleura clothed with black hair ..... 2.
   Pleura in large part clothed with yellow pile ..... 23.
2. Second abdominal segment with six or more marginal bristles ..... 3.
   Second segment with only two marginals ..... 4.
3. Squamae white with brown border ..... *nitidiventris* n. sp.
   Squamae infuscated except the base ..... *floridensis* Tns.
4. Squamae fuscous ..... 5.
   Squamae white or pale yellowish ..... 11.
5. Sternopleura wholly black haired ..... 6.
   Sternopleura largely yellow pilose ..... 10.
6. Propleura with black hair (*nigrocalyptrata* V.d.Wulp.) ..... *pilosa* Drury.
   Propleura with fine yellow hair ..... 7.
7. Face and cheeks usually with fine rather short yellowish pile; posterior forceps of ♂ with raised margins or excised at apex ..... 8.
   Face and cheeks with coarse black hairs; posterior forceps without raised margins, the apical arm not excised ..... *daemon* Wied.
8. Fourth abdominal segment pale pollinose above; second segment without marginals ..... 9.
   Fourth abdominal segment not conspicuously pollinose above ..*antillicolla* C.
9. Arm of posterior forceps excised apically ..... *townsendi* n. sp.
   Arm of posterior forceps tapering ..... *vexor* n. sp.
10. Parafacials and cheeks with fine yellow hairs ..... species
    Parafacials and cheeks with numerous coarser black hairs .... *unguis* Towns.
11. Parafacials and cheeks wholly clothed with fine yellow hairs ..... 12.
    Parafacials and cheeks largely or wholly clothed with coarser black hairs 13.
12. Abdomen wholly shining above (Brazil) ..... *rufiventris* n. sp.
    Abdomen greyish pollinose except segmental apices .... *piliventris* V.d.Wulp.
13. Parafacials clothed with fine vellow hairs on upper half; coarser black hairs below and on the cheeks (Chile) ..... *chilensis* n. sp.
    Parafacials with wholly black hairs or black and yellow mixed, the cheeks with similar pile or pale hair only on the lower posterior portion ..... 14.
14. Sternopleura largely yellow pilose (♀) ..... *rufiventris* n. sp.
    Pleura wholly black haired ..... 15.
15. Intermediate abdominal segments, from posterior view, conspicuously pollinose ..... 16.
    Intermediate segments wholly shining ..... 18.

16. Fourth abdominal segment pollinose ..... 17.
Fourth segment not pollinose above; abdominal pollen whitish *instabilis* n. sp.
17. Fourth segment wholly pollinose (Costa Rica) ..... *palliata* n. sp.
Fourth segment bare on apical one-third ..... *pollinosa* n. sp.
18. Scutellum black, metallic ..... 19.
Scutellum reddish or brownish red ..... 20.
19. Second abdominal segment conspicuously rather thinly pale pollinose on basal half or more; outer forceps of ♂ without bulbous swelling *instabilis* n. sp.
Second abdominal segment at most narrowly pollinose; outer forceps with large bulbous swelling ..... *aterrima* Desv.
20. Costal border not brownish ..... 21.
Costal border broadly brownish ..... *sibillans* Curran.
21. First aristal segment as long as second (Nearctic) ..... *lateralis* Macq.
First aristal segment not much over half as long as second (Brazil) .... 22.
22. Hair of parafacials evenly distributed ..... *peruanus* n. sp.
Parafacials with sparse hair on outer half and two or three strong bristly hairs below ..... *setifacies* n. sp.
23. Squamae at least lightly infuscated except basally; scutellum usually brown or black ..... 24.
Squamae white or yellowish; scutellum reddish or yellowish in ground color ..... 27.
24. Pleura black pilose above ..... (See couplet 7).
Pleura pale pilose except a few black hairs on mesopleura behind, and the usual bristles; ventral portions of tergites practically all black haired .. 25.
25. Thorax steel-blue in ground color, the greyish yellow pollen less conspicuous on the disc ..... 26.
Thorax aeneous or blackish, densely ochreous pollinose, (Peru, Ecuador) ..... *productus* n. sp.
26. Posterior forceps with the apical arms separated by a deep, rather wide incision, the basal ridges absent, ♀ pile of front mostly yellow (B. G. Colombia ..... *vernalis* Curran.
Posterior forceps with the apical arms narrow and contiguous, evidently forming a single apical process, the basal ridges well developed, ♀ frontal pile almost all black, coarse (Mexico, Guatemala) ..... *varicornis* n. sp.
27. Mesonotum pale haired on disc in front of suture and on lateral margins 28.
Mesonotum only pale haired laterally ..... 29.
28. Posterior forceps of ♂ broadly excavated at apex ..... *nivalis* n. sp.
Posterior forceps of ♂ not excavated at apex ..... *apicifera* Walk.
29. Pleura largely black pilose above ..... 30.
Pleura wholly pale pilose, the bristles black ..... 32.
30. Abdomen at least thinly pollinose on the broad bases of the intermediate segments ..... 31.
Abdomen shining with the apical segment whitish pollinose ..... species.
31. Intermediate segments thinly pollinose; second segment without marginals in ♂ ♀ ..... *vexor* n. sp.
Intermediate segments strongly pollinose; second segment with marginals in ♂ ..... *piliventris* Wulp.

32. Abdomen pale rusty yellow; fifth sternite simple, rounded ..... 33.
Abdomen rusty reddish or darker, or the fifth sternite angulate or produced inwardly at apex ..... 34.

33. Palpi normal in shape, enlarged apically (Brazil) ..... *diaphana* Fabr.
Palpi slender, not enlarged apically (Brazil) ..... *willistoni* Curran.

34. Males ..... 35.
Females ..... 43.

35. Outer forceps composed of a single, tapering curved arm or bulbous and grooved at apex ..... 36.
Outer forceps divided into two rather equal arms ..... 39.

36. Outer forceps tapering and curved inwards at apex ..... 37.
Outer forceps broadened and excised at apex ..... *cirphis* Curran.

37. Arm of posterior forceps long, broad, tapering, the basal ridges thick and rounded ..... *plangens* n. sp.
Arm of posterior forceps shorter, narrow, tapering, acute, the basal ridges narrow and high (Peru) ..... 38.

38. Lobes of fifth sternite very sharply rounded and with sub-parallel inner borders ..... *incasana* Tns.
Lobes of fifth sternite broadly rounded on inner apex ..... *prudens* n. sp.

39. Incisure of first and second abdominal segments broadly greyish pollinose the lobes of posterior forceps thickened towards point of attachment or strongly diverging ..... 40.
Incisure normally with obscure brownish pollen or quite shining; apical lobes of fifth sternite strongly produced beyond the inner arms; lobes of posterior forceps very thin and high, usually converging above (*andina* Tns.) ..... *basifulva* Walker.

40. Lobes of fifth sternite with an apical arm which is more than half as long as its width ..... 41.
Lobes of fifth sternite without conspicuous apical arm, only with inwardly directed arm ..... 42.

41. Inner apical arms of fifth sternite very strongly roughened and not nearly as prominent posteriorly as the apical swelling ..... *basifulva* Walker.
Inner apical lobe very lightly roughened and almost as prominent posteriorly as the apex of the lobe (Nearctic) ..... *vulgaris* n. sp.

42. From lateral view the ridges of the posterior forceps are broader than their length (Brazil, Mex.) ..... *lobulatus* n. sp.
From lateral view the ridges are much longer than wide ..... *dux* n. sp.

43. Females of the *analis* group trace here but no satisfactory characters for their separation have been found.

Jurinia metallica Desvoidy.

(Fig. 1).

Essai sur Myodaires, 35, 1830.
Jurinia fuscipennis Jaennicke? Neue Exot. Dipt., 83, 1867.
Jurinia hystrix Williston, Trans. Ent. Soc. Amer., XIII, 299, 1886.
Jurnia adusta Wulp, Biol. Cent. Amer., Dipt., II, 28, 1888 (in part).
Jurinia hystrix Coquillett, Rev. Tachin., 142, 1897 (in part).
Jurinia metallica Coquilett, Rev. Tachin., 147, 1897.

Length, 16 to 17 mm. *Male.* Front and occiput black in ground color, the former yellowish grey pollinose, the head elsewhere white pruinescent. Head

with yellowish white hair on occiput and lower part of cheeks; the hair elsewhere black, the occipital cilia extending to the lower fifth of eye. Palpi reddish, strongly widened on apical third. Antennae black, grey pollinose, the incisures reddish. Front as wide as one eye.

Mesonotum aeneous black, thinly grey pollinose, the lateral margins behind the suture, an arched prescutellar area and the scutellum, reddish. Pleura brownish, grey pollinose; scutellum without pollen or decussate bristles.

Legs black; hind tibiae in part obscure reddish. Wings lightly infuscated; the base dark brown; bend of fourth vein with long appendage. Squamae and halteres brown.

Abdomen shining ferruginous to castaneous; second segment with three to ten pairs of marginal spines, the third with complete row, the fourth with three rather regular rows; apex of abdomen gently emarginate. Sternites with spines.

The lobes of the fifth sternite are rounded apically. Posterior forceps almost as in *nitidiventris* but narrower; the outer forceps also are similar, curved inwards apically and deeply emarginate or shallowly excised.

Female. Front three-tenths wider than eye, the frontal vitta less than half as wide as parafrontal.

Many specimens from Arizona, Virginia, North Carolina, Florida, Mexico, New Mexico, Texas and New York.

This species has been confused with *A. pilosa* and is usually represented in collections as *hystrix* in association with that species. Williston's specimens, which were determined as *hystrix*, have not been located. There are slight differences between the eastern and western forms but I can find nothing of specific value. *A. nitidiventris* is very similar but has much finer bristles on the abdomen, in addition to the white squamae.

The synonymy of this species is very confused and can only be straightened out by an examination of the types. It is impossible to determine from the descriptions whether certain species described belong here or to *A. pilosa* Drury.

Jurinia nitidiventris n. sp.

(Figs. 2, 3).

Black; palpi and antennae reddish, the third segment largely blackish; abdomen castaneous with dark median vitta and apical segment. Length 12 mm.

Male. Robust. Head pale yellowish grey pollinose the face and cheeks white; frontal vitta half as wide as parafrontal, reddish, becoming brown above. Front five-sixths as wide as eye, strongly widening anteriorly; frontals strongly diverging below; four bristles outside frontal row below. Hair of back of head yellowish tinged, the black occipitals extending to the oral border; cheeks with black hairs on anterior half; parafacials with black hairs, the inner ones long and strong; cheeks three-fifths as wide as eye-height. Antennae reddish, the third segment black except basally, not wider than the second segment, rounded apically; arista brown, the penultimate segment two and a half times as long as wide.

Thorax greyish yellow pollinose anteriorly, becoming bare behind, the vittae narrow and indistinct. Three sternopleurals. Scutellum shining brownish red, with rather stout, spine-like bristles, including an apical pair. Hair of thorax wholly black.

Legs black; anterior four femora thinly greyish pollinose behind. Wings a

little cinereous, broadly brown basally; small crossvein clouded with brown. Lower lobe of squamae whitish with deep brown border.

Abdomen polished castaneous with the base, a broad median vitta and apical segment, black. First segment without bristles; second with a pair of strong marginals and one or two short ones close to them; third with a marginal row; fourth with two rows of discals and marginal row and some additional scattered bristles on apical half. Sternal bristles obtuse apically. Lobes of fifth sternite obtusely rounded on apical inner margin. Posterior forceps broad, strongly narrowed to the base of the apically furcate median arm. Outer forceps not furcate, short, forming a stout hook. From lateral view the posterior forceps are unusually flat, the basal part being gently convex on either side. (Ventral view of posterior forceps as in fig. 2).

Holotype.— ♂, San Rafael, Vera Cruz, Mexico, July, 1917 (C. H. T. Townsend), in United States National Museum.

Archytas pilosa Drury.

(Fig. 4).

Musca pilosa Drury, Illustrations of Nat. Hist., Ed. 2, Vol. I, fig. 4,pl. XLV, 1773 (Jamaica).
Musca hystrix Fabr., Syst. Ent., 777, 1775, Ent. Syst. IV, 325, 1785 (America).
Musca hystrix Linne, Syst. Nat., Gmelin ed., Leipsig, p. 2845, 1790 (Amer. Mer.).
Musca hystrix Olivier, Encycl. Method., VIII, 22, 1811 (America).
Tachina hystrix Fabr., Syst. Antl. 310, 1805 (America Merid).
Tachina hystrix Wied., Auss. Zweifl., II, 283, 1830 (N. Amer.).
Jurinia boscii Desv., Myodaires, 36, 1830 (U. S.).
Echinomyia hystrix Macq., Hist. Nat. Dipt., II, 79, 1835 (N. Amer.).
Echinomyia georgiae Macq., Hist. Nat. Dpt., II, 79, 1835 (Ga.).
Echnomyia pilosa Westwood, in Westwood's edit. Drury's Illustr. Nat. Hist., I, p. 104, 1837.
Jurinia virginiensis Macquart, Dipt. Exot., Suppl. IV, (2), 1851.
Jurinia fuscipennis Jaenncke, Neue Exot. Dipt., 83, 1867 (N. A.).
Archytas hystricoides Willist., Tr. Am. Ent. Soc., XIII, 300, 1886 (U. S.).
Archytas hystrix Coq., Rev. Tachinidae, 142 (U. S.).
Echinomyia nigrocalyptrata V. d. Wulp, Biol. Centr. Amer., Dipt., II, 33 and 473.

A large black species, the abdomen, however, frequently brownish red with darker median vitta, the thorax usually blue-black. Length 11 to 15 mm.

Male. Lower half or more of head yellow in ground color, with whitish pollen, the upper portion blackish with deep yellowish pollen. Frontal vitta rusty brownish red, not as wide as parafrontal; two or three bristles outside the frontal row anteriorly; front a little wider than eye, strongly widened anteriorly. Pile of occiput yellowish. Palpi reddish; antennae dark reddish, the third segment broadly black above, strongly produced upwards basally, convex on upper edge, one-third longer than the second segment; first two aristal segments elongate, about four times as long as thick. Pile of face and cheeks black, the cheeks with some yellow hairs below.

Thorax thickly ochreous pollinose on anterior half or less, the dorsal vittae distinct but narrow. Three sternopleurals; the bristles of the mesonotum are rather weak on the disc. Scutellum brownish, with stout marginal bristles and coarse, short, bristles on the disc; a pair of fairly strong decussate apicals. Hair of thorax wholly black.

Legs black; femora greyish pollinose behind. Pulvilli elongate, reddish or luteous.

Wings conspicuously blackish brown with brownish yellow or pale brownish base. Squamae brown. Halteres brownish with reddish apex and base.

First abdominal segment without bristles, the second with marginal pair, third with marginal row, fourth with two rows of stout discals on apical two-thirds and weaker row of apicals. Fifth sternite is rounded apically. Posterior forceps united, broad behind, strongly concave, the single median arm curved at almost right angle and forming a rather acute point. The outer forceps bear a large globular swelling on the basal half, the simple arm being strongly curved inwards apically.

Female. Front one-fifth wider than eye; frontal vitta much narrower than parafrontal. Otherwise differs only sexually.

Numerous specimens from Point Pelee and Lobo, Ontario; Jamaica, Arizona, North Carolina, Colorado, Georgia, Mexico, Missouri, New Mexico, New York, Ohio, Florida, Texas, Pennsylvania, Maryland, Indiana, District of Columbia, Mississippi, Virginia and Kansas. Altogether over two hundred specimens were examined and only one of these was under 13 mm. in length.

The material studied included the types of *hystricoides* Williston, a pair of which have been placed in the Canadian National Collection, and a specimen at present in the United States National Museum (from the British Museum of Natural History) which is either a cotype of *Echinomyia nigrocalyptrata* V. d. Wulp or one of the later specimens recorded by him (l. c. 473). Townsend labelled a specimen in the United States National Museum "*Makasinocera* sp." and his *unguis* is closely related but has yellow pile on the propleura, etc.

The synonymy given for this species may not be wholly correct, but can only be verified by reference to the types. However, this is the species long recognized as *hystrix* Fabr. and as Fabricius considered his species to be identical with Drury's (while still ignoring Drury's name) there is no doubt about which name should be used. Drury's first volume appeared in 1770 with descriptions but no names. In 1773 the second volume appeared with the names given in the index. Fabricius did not name the species until 1775 and in doing so referred to *Musca pilosa* as a synonym. In this he has been followed by various authors and in his Catalogue Aldrich credits the reference of *pilosa* Drury as a synonym of *hystrix* to Wiedemann who merely quoted the original description. Williston's *hystricoides* was described owing to the misidentification of *J. metallica* Desv. as *hystrix* Fabr., he evidently concluding that Fabricius name was more applicable to that species than to *hystrix*, and I was at first inclined to follow him. The type (so called) of *hystrix* Fabr. is in the Copenhagen Museum but it cannot be considered a type in view of his description and Drury's type, I believe, is not extant.

Some of the synonymy given undoubtedly refers to *J. metallica* but it is impossible to arrive at any conclusions. For the most part I have followed Aldrich and have merely added several references not given in his Catalogue, especially the early ones.

Archytas daemon Wiedemann.

(Fig. 5).

Tachina daemon Wiedemann, Auss. Zweifl., II, 292, 1830.

Resembles a small specimen of *pilosa* but the thorax is almost wholly greyish yellow pollinose from posterior view, the third antennal segment is but little

produced upwards basally, there are fewer abdominal bristles and the propleura is pale yellow pilose in the middle in the ♂. Length, 12-13 mm.

Male. Upper half of occiput and the parafrontals black in ground color, the former grey pollinose, the latter with thin ochreous pollen, unusually shining; face and cheeks white pollinose. Front slightly wider than eye; three or four bristles outside the frontals below; frontal vitta strongly narrowed above, rusty brownish, two-thirds as wide as parafrontal. Palpi broad, luteous, black haired. Antennae black, the incisures reddish (fig. 5).

Thorax bluish black, thickly yellowish or grey pollinose, the pollen much thinner posteriorly, the vittae slender, distinct. Hair black except on the portion around the median section of propleura. Scutellum brownish with steel-blue reflections, four pairs of strong, depressed marginals and some weaker ones including decussate apicals; discal hairs short and bristly, erect. Three or four sternopleurals.

Legs black; anterior femora grey behind. Pulvilli yellow, moderately long.

Wings fairly strongly smoky, rather luteous anteriorly; squamae brown. Halteres yellow with brownish knob.

Abdomen shining black, the sides sometimes more or less castaneous. First segment without bristles, second with a pair of marginals, third with complete row; fourth with two irregular rows of discals on apical two-thirds and finer row of marginals; the black hair is abundant, fairly long, appressed on basal segments but becoming erect apically. Lobes of fifth sternite rounded apically. Posterior forceps rather flat on basal section, but still a little concave, the single arm tapering, turning upwards at almost right angle.

A single specimen from Chapada, Brazil (Smith-Williston Coll.). Additional specimens are in the American Museum of Natural History.

The specimen before me agrees perfectly with Wiedmann's description which seems to be quite sufficient for recognition. There might, however, be other species agreeing sufficiently well to lead to confusion.

(To be continued)

Mailed Tuesday, September 4th, 1928.